OCEAN GALES AND STORMS, JANUARY, 1931

Vessel	Voyage		Position at time of lowest barometer		Gale began	Time of lowest barometer	Gale ended	Lowest barometer	Direction of wind when gale began	Direction and force of wind at time of lowest barometer	Direction of wind when gale ended	Highest force of wind and direction	Shifts of wind near time of lowest barometer
	From—	To—	Latitude	Longitude									
NORTH ATLANTIC OCEAN			° ′	° ′				*Inches*					
Peter Kerr, Am. S. S.	London	Philadelphia	39 20 N	41 05 W	Dec. 30	4 a, 1	Jan. 3	29.08	WSW	W, 12	WNW	W, 12	Steady.
City of Alton, Am. S. S.	Antwerp	New York	44 25 N	40 20 W	Dec. 31	2 a, 1	Jan. 2	28.77	SSE	SW, 8	NNW	NNW, 12	SW-NW.
Motocarline, Belg. M. S.	Esbjerg	Baytown	41 59 N	27 52 W	Jan. 1	1 p, 1	do	29.33	SW	SW, 8	SW	SW, 10	Steady.
Coldwater, Am. S. S.	Antwerp	Charleston	32 48 N	65 58 W	do	2 a, 2	do	29.47	S	W, 10	N	—, 10	S-W-NW.
Collamer, Am. S. S.	Bordeaux	New York	35 20 N	58 00 W	Jan. 2	2 p, 2	do	29.37	S	SW, 10	NNW	SW, 10	SW-W-NW.
Emile Francqui, Fr. S. S.	Antwerp	do	45 05 N	45 30 W	Jan. 3	4 a, 3	Jan. 3	29.03	N	N, 12	N	N, 12	Steady.
McKeesport, Am. S. S.	Havre	do	47 48 N	28 00 W	do	2 a, 4	Jan. 4	29.12	SSE	S, 7	NW	NNW, 10	S-W-NNW.
Silverlarch, Br. M. S.	Genoa	do	36 23 N	68 13 W	Jan. 5	2 p, 6	Jan. 7	29.32	SSW	SW, 10	NW	SW, 10	SSW-WNW.
Peter Kerr, Am. S. S.	London	Philadelphia	36 20 N	59 50 W	Jan. 6	6 a, 7	Jan. 8	29.36	SW	WSW, 8	WNW	S, 12	SW-WSW.
Augustus, Ital. S. S.	Naples	New York	37 50 N	48 54 W	Jan. 7	4 p, 7	do	29.59	S	S, —	W	S, 11	S-W.
Peter Kerr, Am. S. S.	London	Philadelphia	37 05 N	64 05 W	Jan. 9	10 p, 9	Jan. 11	29.36	NNE	NNE, 10	NNW	NNE, 12	Steady.
Quaker City, Am. S. S.	Hull	do	42 31 N	61 20 W	Jan. 10	8 a, 10	do	29.53	ENE	ENE, 7	W	NW, 11	
Marie Leonhardt, Ger. S. S.	Antwerp	New York	36 01 N	73 22 W	Jan. 12	8 p, 12	Jan. 12	29.61	S	S, —	W	—, 11	
Bloomersdijk, Du. S. S.	Beaumont	Rotterdam	37 26 N	63 05 W	Jan. 15	3 p, 15	Jan. 16	28.80	WSW	WSW, 10	NW	NW, 12	WSW-WNW.
River Tigris, Br. S. S.	Gibraltar	New York	35 40 N	59 50 W	do	1 p, 15	do	29.51	W	W, —	NW	W, 12	W-NW.
Emile Francqui, Fr. S. S.	New York	Antwerp	41 42 N	55 00 W	do	4 a, 16	do	28.90	S	S, 11	SW	S, 11	S-SW.
Milwaukee, Ger. M. S.	Galway	New York	48 44 N	36 00 W	Jan. 17	10 a, 17	Jan. 18	29.55	SW	S, 11	WNW	S, 11	SW-S-WNW.
Amapala, Hond, S. S.	Canal Zone	New Orleans	25 10 N	87 20 W	Jan. 20	8 p, 20	Jan. 21	29.92	N	N, 9	N	N, 10	Steady.
Bellflower, Am. S. S.	New York	Glasgow	51 40 N	35 44 W	Jan. 21	5 p, 21	Jan. 22	29.32	NE	SSE, 7	W	W, 9	SSE-W.
Europa, Ger. S. S.	Cherbourg	New York	50 00 N	14 12 W	Jan. 23	11 a, 23	Jan. 23	29.32	SW	W, 10	W	W, 10	SW-WNW.
Bowes Castle, Br. S. S.	Galveston	Havre	38 48 N	62 24 W	Jan. 24	Mdt, 24	Jan. 25	29.93	NW	WNW, 10	N	—, 10	
Europa, Ger. S. S.	Cherbourg	New York	45 42 N	42 24 W	Jan. 25	1 a, 25	do	29.18	S	S, 9	NW	SW, 10	S-NW-WNW.
Rotterdam, Du. S. S.	Rotterdam	do	46 57 N	36 51 W	Jan. 26	9 a, 27	Jan. 28	29.64	SW	SW, 9	NW	SW, 9	
Bannack, Am. S. S.	Liverpool	Boston	51 20 N	24 30 W	Jan. 27	8 p, 29	Jan. 30	29.47	S	SSW, 8	NNW	—, 9	
Wytheville, Am. S. S.	New York	Rotterdam	50 51 N	32 00 W	Jan. 31	8 p, 31	Jan. 31	29.47	ESE	S, 9	SW	S, 9	ESE-SSW.
Express, Am. S. S.	Seville	New York	37 09 N	65 14 W	Jan. 30	Noon, 31	Feb. 1	29.47	NW	SW, 9	NW	SW, 10	
NORTH PACIFIC OCEAN													
President Grant, Am. S. S.	Yokohama	Seattle	50 13 N	173 41 W	Jan. 1	4 p, 5	Jan. 7	27.78	NNW	S, 8	SSW	ESE, 10	E-SE-S W.
Diana Dollar, Am. S. S.	Tobaco, P. I.	Los Angeles	38 24 N	171 23 E	do	11 p, 1	Jan. 2	29.63	W	W, 9	WNW	W, 10	1 point.
Arabia Maru, Jap. S. S.	Yokohama	Vancouver	49 43 N	134 10 W	Jan. 2	3 a, 3	Jan. 3	29.03	SE	SE, 8	SSE	WSW, 9	W-S-SSE.
Diana Dollar, Am. S. S.	Tabaco, P. I.	Los Angeles	41 09 N	174 40 W	Jan. 3	3 a, 4	Jan. 4	29.29	SSE	SSE, 10	W	W, 10	10 points.
Edgemoor, Am. S. S.	San Pedro	Yokohama	33 35 N	160 00 E	do	2 a, 4	do	29.48	SW	WNW, —	NW	NW, 9	WSW-NW.
Silverelm, Br. M. S.	Manila	San Francisco	39 21 N	170 07 E	do	6 a, 4		28.90	SE	SW, 12		—, 12	SW-W-WNW.
Bellingham, Am. S. S.	Hong Kong	do	44 40 N	168 30 E	do	7 a, 4	Jan. 6	28.66	E	NNE, 10	SW	W, 10	4 points.
Scalaria, Br. S. S.	Kobe	San Pedro	47 06 N	175 15 W	do	Noon, 4	Jan. 8	28.06	SE	SW, 10	SW	SW, 12	WSW-S-SW.
Northwestern, Am. S. S.	Seattle	Seward	58 14 N	137 16 W	Jan. 4	2 a, 4	Jan. 4	28.92	NE	NE, 7	N	NE, 9	NE-N.
Golden Peak, Am. S. S.	Shanghai	San Francisco	40 25 N	164 55 W	do	11 a, 4	Jan. 5	29.29	SE	S, 9	W	S, 9	SE-S-W.
Emma Alexander, Am. S. S.	San Diego	Seattle	45 00 N	124 50 W	Jan. 5	6 a, 5	do	29.21	SE	Calm	NW	NW, 12	SE-NW.
Empress of Canada, Br. S. S.	Yokohama	Vancouver	49 23 N	167 15 W	do	1 p, 6	Jan. 7	28.19	SW	SW, 11	SSW	SW, 11	SSE-S-SW.
San Pedro Maru, Jap. M. S.	Takao	San Francisco	36 08 N	152 03 E	Jan. 6	6 p, 10	Jan. 12	29.18	NE	SW, 6	NW	S, 10	NE-E-S.
Arizona Maru, Jap. S. S.	Yokohama	Victoria	50 12 N	156 35 W	Jan. 9	8 p, 9	Jan. 10	28.83	SE	SSW, 9	SSW	SSW, 9	SE-SW-SSW.
Kentucky, Am. S. S.	Hong Kong	San Francisco	28 29 N	129 18 E	do	4 p, 9	do	29.84	NW	NW, 4	NW	NW, 9	Steady.
Scalaria, Br. S. S.	Kobe	San Pedro	43 50 N	145 40 W	Jan. 10	10 p, 10	Jan. 11	29.30	SE	S, 7	WNW	W, 9	SE-S-WNW.
Choyo Maru, Jap. S. S.	Miike	Seattle	46 38 N	176 36 E	Jan. 11	Mdt, 11	do	29.07	S	SW, 3	SW	SE, 10	8 points.
Nora, Am. S. S.	San Pedro	Yokohama	30 41 N	156 35 E	Jan. 14	Noon, 14	Jan. 14	29.83	SW	SW, 9	W	W, 10	SW-W.
Golden Star, Am. S. S.	Hong Kong	San Francisco	40 28 N	154 51 W	do	2 p, 15	Jan. 15	29.28	S	S, 5	NW	S, 11	S-W-NW.
Choyo Maru, Jap. S. S.	Miike	Seattle	49 08 N	158 07 W	do	4 p, 15	Jan. 17	28.43	S	S, 4	SE	SE, 11	4 points.
San Pedro Maru, Jap. M. S.	Takao	San Francisco	38 34 N	178 50 E	do	4 p, 15	Jan. 15	29.02	SE	WSW, 8	NW	W, 11	SE-SW-NW.
Holystone, Br. S. S.	Panama	Vancouver	43 22 N	125 00 W	Jan. 15	3 p, 15	Jan. 16	29.89	S	SW, 7	NW	W, 10	S-SW-W.
City of Victoria, Can. S. S.	Japan	Port Alice	50 37 N	161 58 W	do	6 p, 15	Jan. 17	28.19	ESE	SE, 7	ESE	ESE, 9	SE-ESE.
Shabonee, Br. S. S.	Manila	San Pedro	35 52 N	166 14 W	do	9 p, 15	do	29 14	S	—, 10	NW	—, 10	S-SW-W.
Golden Star, Am. S. S.	Hong Kong	San Francisco	40 45 N	148 37 W	Jan. 16	5 a, 16	do	29.58	SW	SE, 8	W	SE, 9	S-SW-W.
Shabonee, Br. S. S.	Manila	San Pedro	35 52 N	149 30 W	Jan. 18	—, 19	Jan. 19	29.14	S	—, —	NW	—, 11	SSW-W-WNW.
Hanover, Am. S. S.	do	do	39 55 N	166 00 W	Jan. 21	5 a, 22	Jan. 22	29.12	S	S, 8	S	S, 9	Steady.
Admiral Watson, Am. S. S.	San Francisco	Portland, Oreg	43 49 N	124 23 W	do	10 p, 21	Jan. 23	29.60	SE	—, 8	S	—, 9	SE-S.
San Diego Maru, Jap. M. S.	Elwood	Kudamatsu	32 35 N	138 45 E	Jan. 22	3 p, 23	do	29.71	S	WSW, 8	NW	SW, 9	WSW-NW.
Modjokerto, Du. S. S.	Menato	Los Angeles	33 30 N	141 30 W	Jan. 25	Noon, 24	Jan. 24	29.68	S	SW, 9	SW	SW, 9	S-SW-WSW.
Nora, Am. S. S.	Yokohama	San Pedro	35 02 N	148 00 E	do	8 a, 23	Jan. 25	29.72	S	S, 7	NW	W, 9	W-NW.
Hakubasan Maru, Jap. M. S.	do	San Francisco	46 25 N	174 00 W	Jan. 24	3 p, 27	Jan. 28	28.43	ESE	SSE, 8	SSW	SSW, 9	ESE-S-WSW.
Paul Luckenbach, Am. S. S.	New York	San Pedro	15 25 N	94 35 W	do	4 p, 24	Jan. 25	29.81	NW	N, 9	NW	—, 9	NW-N-NNE.
William Penn, Am. M. S.	Iloilo, P. I.	do	30 22 N	166 32 E	do	6 p, 25	Jan. 26	29.69	WSW	WNW, 7	WNW	—, 9	WNW-WSW.
Emidio, Am. S. S.	Richmond Beach, Wash.	do	44 55 N	124 30 W	Jan. 25	6 a, 25	Jan. 25	29.77	S	S, 9	SSW	SSW, 9	S-SSW.
Hiye Maru, Jap. M. S.	Yokohama	Victoria	45 27 N	163 09 E	Jan. 26	1 a, 28	Jan. 28	28.02	ESE	S, 6	S	WSW, 10	SE-SW.
Makua, Am. S. S.	Columbia River.	Honolulu	36 00 N	141 15 W	Jan. 27	8 p, 27	do	29.50	SE	SE, 10	SW	—, 10	SE-SW.
Ixion, Br. S. S.	Yokohama	Victoria	49 20 N	178 12 W	do	7 p, 27	Jan. 29	27.99	E	E, 6	S	ENE, 10	SE-E-S.
Wisconsin, Am. S. S.	Japan	San Francisco	47 35 N	179 30 W	do	7 a, 29	do	28.02	SE	N, 4	W	W, 9	SE-NW-NE.
Ohioan, Am. S. S.	Los Angeles	New York	Morro Ayuca, L. H.		Jan. 29	4 p, 29	do	29.88	NNE	NNE, 8	N	NNE, 9	NNE-N.
Northwestern, Am. S. S.	Seattle	Seward	60 35 N	146 00 W	do	2p, 29	do	29.08	E	E, 7	NE	E, 9	E-NE.

NORTH PACIFIC OCEAN

By WILLIS E. HURD

Atmospheric pressure.—During December, 1930, pressure showed a great tendency to fall in the Aleutian region. The descent continued in January, and for this month unprecedentedly low averages occurred over the Alaskan Peninsula and neighboring islands. At Dutch Harbor, with a maximum daily barometric reading of 29.68 inches and a minimum of 28.22, the average for the first time on record for any month was below 29 inches and more than six-tenths of an inch below the normal. Between Dutch Harbor, with 28.94 inches, and Honolulu, where the average was 30.07, there existed a mean gradient for the month of 1.13 inches. The LOW extended well into the central Pacific, and as a consequence the usual anticyclone of middle latitudes was generally unstable and much restricted in area. On the average

it covered the coastal waters of the United States from Oregon to Lower California and the major part of the ocean otherwise between the fifteenth and thirtieth parallels.

The following table gives barometric data for several island and coast stations in west longitudes, including Point Barrow on the Arctic Ocean:

TABLE 1.—*Averages, departures, and extremes of atmospheric pressure at sea level at indicated hours, North Pacific Ocean and adjacent waters, January, 1931*

Stations	Average pressure	Departure from normal	Highest	Date	Lowest	Date
	Inches	*Inch*	*Inches*		*Inches*	
Point Barrow [1]	30.06	−0.02	30.72	21st	29.60	8th.
Dutch Harbor [1]	28.94	−0.64	29.68	4th	28.22	6th.
St. Paul [1]	29.07	−0.56	29.76	4th	28.44	7th.
Kodiak [1]	29.11	−0.48	29.60	17th	28.66	14th.
Midway Island [1]	29.99	−0.04	30.26	10th [3]	29.64	25th.
Honolulu [2]	30.07	+0.07	30.26	1st	29.88	26th.
Juneau [2]	29.62	−0.26	30.26	17th	28.97	4th.
Tatoosh Island [2] [4]	29.94	0.00	30.48	17th	29.33	22d.
San Francisco [2] [4]	30.12	+0.03	30.32	16th	29.75	7th.
San Diego [2] [4]	30.07	+0.01	30.32	4th	29.80	6th.

[1] Averages from p. m. observations only.
[2] A. m. and p. m. observations.
[3] And on the 11th.
[4] Corrected to 24-hour mean.

NOTE.—Beginning with January, 1931, new normals of atmospheric pressure are in use for Midway Island and the Alaskan substations appearing in this table. For Dutch Harbor, St. Paul, Kodiak, and Midway Island the average covers a period of 12 years and for Point Barrow 8 years. Data are compiled to include the year 1928.

January, 1931, was peculiarly a stormy month on the North Pacific Ocean and no day passed without gales in some portion of the sea, although they were generally well distributed over all the region from the thirtieth parallel northward. According to reports already received wind forces of 11 to 12 occurred on at least 10 days of the month, and forces of 10—whole gales—on more than half the days, in many cases blowing simultaneously in connection with widely separated disturbances. The tabular statement—Ocean gales and storms—presents a picture of the general storminess, showing gales of force 9 and upward, which needs no fuller amplification in text.

Several of the important local gales of major storm force were associated with the activities of the Aleutian LOW; some were due to the sharp expansion of the cyclone region against the immediately outlying anticyclone, which resulted in the formation of sudden steep barometric gradients, while others accompanied the more powerful of the progressive cyclones.

The severest cyclone of the month originated south of Japan on the 1st or 2d and began moving rapidly northeastward. By the 3d, then central at some distance southeast of the Kuril Islands, it attained hurricane intensity. On the 4th, south of the central Aleutians, it was causing dangerous gales over a great region along the upper routes between 160° E. and 170° W. On the 5th and 6th, now of great depth and continuing high wind intensity, it crossed the eastern Aleutians. The following three days witnessed its rapid decadence as it contracted in area and wandered aimlessly over the eastern waters of the Bering Sea. This storm was remarkable for its extremely low central pressure during the 4th and 5th, corrected barometer readings from the American steamer *President Grant* running below 28 inches for several hours, the minimum being 27.78, in 50° 13′ N., 173° 41′ W., on the 5th.

On the 5th, also, on the eastern extremity of the general Aleutian disturbance, hurricane velocities from the northwest occurred off the Washington coast near North Head, and strong to storm gales, mostly southerly, were encountered off this and the Oregon coast on the 21st, 22d, and 25th. A maximum velocity of 67 miles an hour from the south was recorded on the 22d at the Weather Bureau station on Tatoosh Island.

Midway along the sailing routes between the United States and Honolulu gales of force 8 to 10 occurred on 8 or more days, this region being unusually stormy. The period of most prolonged storminess here was from the 23d to 27th.

As indicative of the unusually long-sustained southward extension of the storm area for January this year, it is necessary only to remark that gales of force 8 to 10 occurred at various times and in various longitudes on about half the days of the month even in as low a latitude as that of the thirtieth parallel, a fact that, in the opinion of the writer, can not be duplicated by any other month of record.

In the China Sea one typhoon—the only North Pacific tropical cyclone of the month—was a brief disturbing weather factor. This is treated in the subjoined article. The northeast monsoon, however, blew at times with fresh gale force on several days, particularly on the 10th to 16th west of the Philippine Islands.

In and near the Gulf of Tehuantepec northers of gale force—8 to 10—were unusually frequent, occurring on at least 12 days of the month.

Strong northeast trades, rising to moderate gale force, were reported by the American steamer *Sierra* between 1° and 15° north latitude south of the Hawaiian Islands on the 13th to 15th.

At Honolulu the wind was generally light with prevalence from the east. The maximum velocity was 24 miles an hour from the northeast on the 18th.

Fog was rarely encountered on the Pacific this month except along or at no great distance from the coasts. Vessels up to time of this writing (March 2) have reported fog off the China coast on 6 days and in American waters between Vancouver and San Diego on 11 days.

TYPHOONS AND DEPRESSIONS

FIRST DESTRUCTIVE TYPHOON OVER THE PHILIPPINES IN 1931, JANUARY 3 AND 4

By REV. JOSÉ CORONAS, S. J.

[Weather Bureau, Manila, P. I.]

The Philippines have been visited at the beginning of this year by a very destructive typhoon, more severe than any of the typhoons experienced in our archipelago during the past year, 1930. Taking into consideration the Provinces most affected by this typhoon, it can be compared with that of October 15, 1912, although it was not so deep and of much less extension. Yet great damage was done to the crops and to the public and private properties, thousands of people remained homeless, besides a considerable loss of life that has been reported from several Provinces.

The typhoon was probably formed on December 30, 1930, nearly 300 miles to the south of Guam in about 145° longitude E. and 9° latitude N. It moved W. by N. and passed near to the north of Yap at 11 p. m. of December 31 when a barometric minimum of 749 mm. (29.49 ins.) was recorded with winds from W., force 5. From 2 to 10 p. m. of January 2 the typhoon took a WSW. direction: hence instead of entering the Philippines through the southern part of Samar, as it could be anticipated, it